Who's Hit Hardest by Heat Waves? with Colleen Reid

Ernie Hood

Heat waves kill more people in the United States each year than any other natural hazard, and many regions worldwide are experiencing more frequent and more severe heat waves. But not all people and not all places have the same vulnerability to heat-related health effects. Identifying those who are more vulnerable will be critical to effective public health interventions. In this podcast, Colleen Reid discusses an innovative method for mapping the sections of urban areas across the United States where residents are more likely to suffer heat-related health effects. Reid is the lead author of "Mapping community determinants of heat vulnerability" and a PhD candidate at the University of California, Berkeley.

AHEARN: It's *The Researcher's Perspective*. I'm Ashley Ahearn.

In the U.S. heat waves kill more people than any other natural disaster.[1] And certain subgroups of the population are known to be more vulnerable to these periods of extreme heat than others.[2]

The key to better public health management of heat waves could be better maps predicting where heat-related health effects are most likely to strike.

Colleen Reid is a Ph.D. student at UC Berkeley. She published a paper in *EHP* titled "Mapping Community Determinants of Heat Vulnerability,"[3] and she told science writer Ernie Hood about her findings.

REID: Some of the factors that we looked at were being over 65 years of age, living alone, living below the poverty line, having less than a high-school education, being of a race other than white, living in a community with little green space, having ever been diagnosed with diabetes, and living in a home without air conditioning, whether that's central air or just even one room with a unit air conditioner.

HOOD: What does this research tell us that we didn't know before?

REID: Well, within the climate change and health community there's been a lot of talk about the need for vulnerability maps for various health outcomes related to climate change. But as far as we know, no one has mapped heat vulnerability at the country level for the United States.

When we did this map, we found higher vulnerability along the Pacific coast and in the

Northeast, and the Southeast showed overall less vulnerability. When we examined this a little further, we found that air-conditioning prevalence did play a significant role in the higher vulnerability in the Northeast and the Pacific coast. However, it wasn't the only factor, and not all of the most vulnerable areas had low air-conditioning prevalence. So there were other vulnerability factors that were playing a significant role.

It's important to note that people adapt to the climate that they live in, physiologically, behaviorally, and technologically. And so what would be considered a heat wave in Seattle wouldn't be considered a heat wave in Phoenix, for example. And we know that heat waves can happen anywhere; we just don't know exactly when they would happen.

HOOD: I see. And what did you find out about the vulnerability of various populations?

REID: Well, we also found that within any city, regardless of its overall vulnerability to heat, there were clusters of higher vulnerability in the downtown areas. So for example, even though Dallas had overall lower vulnerability compared to other municipal areas in the country, it still had a cluster of higher vulnerability in the center city and lower vulnerability in the surrounding area. And downtown areas tend to be more vulnerable because they normally have less green space, and in the U.S. there's often higher poverty and other social vulnerability factors in downtown areas.

HOOD: What might public health officials and other authorities do with the mapped heat vulnerability data? How will this type of information help guide their interventions and utilization of resources?

REID: One of the recommendations in our study is for public health officials to use the methodology outlined in our paper to conduct their own local vulnerability analyses. Local-level analysis is important for a couple of reasons. The relationship between vulnerability variables may be different at smaller spatial scales, and local public health agencies may have access to data on vulnerability variables that we were not able to include in our analysis because we didn't have nationwide data for those variables. One example of this would be cardiovascular disease prevalence, which is one of many pre-existing health conditions that denotes increased vulnerability to heat.

Additionally, local public health agencies can target their interventions to the specific areas within their jurisdiction that are most vulnerable. Given that budgets for public health are significantly reduced in many areas right now, being able to target those interventions can help with limited resources. And, many cities have implemented heat

health warning systems, which have shown some success in decreasing mortality in heat waves after their implementation. So with these maps we're trying to see where the vulnerable groups are, so that intervention can be made at the local level, to target those more vulnerable areas in any given city.

HOOD: Based on your study, aside from commonsense guidelines that most of us know about what to do in a heat-wave situation, is there anything else that people at the individual level should be aware of?

REID: People who are on medications for certain psychiatric disorders may not be able to regulate their body temperatures well because the medications alter that functioning in their bodies. And so people should talk to their doctors to find out whether they are on medications that have this effect, and then therefore realize that they are more vulnerable and should take further precautions to stay cool during a heat wave.

Another important thing is that if you turn on a fan during a heat wave, make sure to open a window. If the window is closed, the fan will just recirculate the hot air, which does not cool the environment and actually can be worse than not having the fan on in the first place.

AHEARN: That was Colleen Reid talking with science writer Ernie Hood. Reid is a Ph.D. student at UC Berkeley.

And that's *The Researcher's Perspective*. I'm Ashley Ahearn. Thanks for downloading!

References

[1] Borden KA, Cutter SL. Int J Health Geogr 7:64 (2008); doi:10.1186/1476-072X-7-64.
[2] Lugo-Amador NM, et al. Emerg Med Clin North Am 22(2):315–27, viii (2004); doi:10.1016/j.emc.2004.01.004.
[3] Reid CE, et al. Environ Health Perspect 117(11):1730–1736 (2009); doi:10.1289/ehp.0900683.